Summary of EN 12976 Test Results, annex to Solar KEYMARK Certificate Kurzfassung EN 12976 Test Ergebnisse, Anlage zum Solar KEYMARK-Zertifikat Synthèse des résultas d'essais selon EN 12976, Annexe au certificat Solar KEYMARK	**Registration No.** Registernummer Num. d'enregistremen	**SKM 9965/12**
	Date / Datum / Date	30/12/2013

Company / Firma / Société	NOBEL INTERNATIONAL EAD		**Country**/Land/Pays	BULGARIA
Street / Straße / Rue	48, VITOSHA BLV		**Website**	
Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax	+0359 2 4210232

System classification / G / F	
Flow principle / G / F	Thermosyphon / G / F
Direct / indirect / G / F	Direct / G / F
Press. principle / G / F	Closed / G / F
Drain back/down / G / F	No drain (always filled) / G / F
Storage location / G / F	Outdoor / G / F
Storage position / G / F	Horizontal / G / F
Int. back-up / G / F	None / G / F
If other: / G / F	English / Deutsch / Francais
EN12976 type / G / F	Solar only / G / F

Collector(s) / Kollektor(en) / Capteur(s)

Company / Hersteller / Manufactuer	NOBEL INTERNATIONAL
Keymark reg, no. (optional)	*SKM 9965/9*

Model Bezeichnung Modéle	**Per module** / G / F: **Aperture area (Aa)** Aperturfläche (Aa) Superficie d'entrée (Aa)	**Gross length** Länge (Außenmaß) Longueur Hors tout	**Gross width** Breite (Außenmaß) Largeur hors Tout	**No. modules** G F		
	m²	m	m	min - max		
AELIOS ALB 1500	1,4	1,53	1,03	1	-	1
AELIOS ALB 2000	1,88	2,03	1,03	1	-	1
AELIOS ALB 2600	2,37	2,03	1,28	1	-	1

Storage(s) / Akkumulator(en) / F

Company / Hersteller / Manufactuer	NOBEL INTERNATIONAL

Model Bezeichnung Modéle	**Total volume** G F	**Gross diameter/width** Diam. / Breite (Außenmaß) Diam. / Largeur hors Tout	**Gross length** Länge (Außenmaß) longeur hors tout	**Back-up heated volume** G F	**El. back-up power** G F
	litres	mm	mm	litres	kW
120L	115	580	782	~	0 ~ 4
160L	150	580	1053	~	0 ~ 4
200L	190	580	1312	~	0 ~ 4
320L	310	580	2072	~	0 ~ 4

Controller / G / F		**Fluid** / G / F		
Company/Hersteller/Manufacteur		**Company**/Hersteller/Manufacteu		
Model / Bezeichnung / Modéle		**Model** / Bezeichnung / Modéle	Propylene glycol solution	
Functions G F	English Deutsch Francais	**Freezing point** G F	-6 to 10	°C

System family overview / G / F

Collector G F	**No. collectors** / G / F — **Storage** / G / F: 120L						160L						200L						320L						0					
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														
0																														
0																														

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number / Prüberichtsnummer / F	6029 DE2, 6034 DE2, 6034 F2
Date of test report / Datum G / date F	4/9/2013

Comments of test lab / Kommentare des laboratoriums / Commentaires du laboratoire

English

Deutsch

Francais

Stamp & signature of test lab

Central Offices: Dragoumi 6, 145 61 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexiou@dqshellas.gr

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	Date / Datum / Date	30/12/2013

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Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax +0359	2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F **Storage type** / G / F 120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F						AELIOS 120/2 ALB
Collector type G F	AELIOS ALB 2000	**No. collectors** G F	1	**Storage type** G F	120L	

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	80 l/d	110 l/d	140 l/d	80 l/d	110 l/d	140 l/d	80 l/d	110 l/d	140 l/d	80 l/d	110 l/d	140 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	1.244	1.708	2.172	711	854	937	57,4	50,1	43,2			
Würzburg, DE	1.191	1.638	2.085	696	847	946	58,5	51,8	45,3			
Davos, CH	1.349	1.848	2.356	990	1.165	1.261	73,7	63,1	53,7			
Athens, GR	929	1.270	1.621	837	1.069	1.253	90,5	84,3	77,6			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
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Test report id. number / Prüberichtsnummer / F	6029 DE2, 6034 DE2, 6034 F2
Date of test report / G / F	4/9/2013
Test method / G / F	ISO 9459-5 (DST)

Comments of test lab / Kommentare des laboratoriums / Commentaires du laboratoire

English
Deutsch
Francais

Stamp & signature of test lab

Version 0.5, 04-02-2008

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Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F **Storage type** / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F						AELIOS 160/2 ALB
Collector type G F	AELIOS ALB 2000	**No. collectors** G F	1	**Storage type** G F	160L	

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	1.708	2.172	2.637	870	972	1.042	51,0	44,8	39,5			
Würzburg, DE	1.638	2.085	2.532	863	972	1.051	52,7	46,9	41,5			
Davos, CH	1.848	2.356	2.856	1.191	1.314	1.384	64,4	55,7	48,4			
Athens, GR	1.270	1.621	1.962	1.077	1.279	1.428	85,0	79,1	72,8			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number / Prüberichtsnummer / F	6029 DE2, 6034 DE2, 6034 F2
Date of test report / G / F	4/9/2013
Test method / G / F	ISO 9459-5 (DST)

Comments of test lab / Kommentare des laboratoriums / Commentaires du laboratoire

English
Deutsch
Francais

Stamp & signature of test lab

Central Offices: Dragoumi 6, 145 61 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexiou@dqshellas.gr

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	Date / Datum / Date	30/12/2013

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Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax +0359	2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 160/2.6 ALB
Collector type G F	AELIOS ALB 2600	**No. collectors** G F	1	**Storage type** G F	160L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	1.708	2.172	2.637	972	1.121	1.226	57,1	51,7	46,5			
Würzburg, DE	1.638	2.085	2.532	955	1.113	1.235	58,3	53,5	48,8			
Davos, CH	1.848	2.356	2.856	1.358	1.551	1.682	73,5	66,0	58,7			
Athens, GR	1.270	1.621	1.962	1.148	1.393	1.603	90,5	86,1	81,5			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm SE	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
Website	www.solar.demokritos.gr
Test report id. number / Prüberichtsnummer / F	6029 DE2, 6034 DE2, 6034 F2
Date of test report / G / F	4/9/2013
Test method / G / F	ISO 9459-5 (DST)

Comments of test lab / Kommentare des laboratoriums / Commentaires du laboratoire

English
Deutsch
Francais

Stamp & signature of test lab

Version 0.5, 04-02-2008

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	Date / Datum / Date	30/12/2013

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Street / Straße / Rue	48, VITOSHA BLV		**Website**	
Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 160/3 ALB
Collector type G F	AELIOS ALB 1500	**No. collectors** G F	2	**Storage type** G F	160L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d	110 l/d	140 l/d	170 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	1.708	2.172	2.637	1.016	1.174	1.288	59,3	54,2	49,0			
Würzburg, DE	1.638	2.085	2.532	990	1.156	1.288	60,3	55,4	50,8			
Davos, CH	1.848	2.356	2.856	1.419	1.629	1.770	76,6	69,0	61,8			
Athens, GR	1.270	1.621	1.962	1.165	1.419	1.638	92,0	87,9	83,4			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
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			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 200/2 ALB
Collector type G F	AELIOS ALB 2000	**No. collectors** G F	1	**Storage type** G F	200L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	170	200	250	170	200	250	170	200	250	170	200	250
	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	2.637	3.101	3.881	1.060	1.121	1.174	40,3	36,0	30,3			
Würzburg, DE	2.532	2.970	3.714	1.069	1.130	1.183	42,4	37,9	31,9			
Davos, CH	2.856	3.364	4.205	1.402	1.463	1.515	49,1	43,5	36,1			
Athens, GR	1.962	2.313	2.891	1.445	1.568	1.664	73,7	67,7	57,7			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
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System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 200/2.6 ALB
Collector type G F	AELIOS ALB 2600	**No. collectors** G F	1	**Storage type** G F	200L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	170	200	250	170	200	250	170	200	250	170	200	250
	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	2.637	3.101	3.881	1.218	1.296	1.375	46,3	41,8	35,4			
Würzburg, DE	2.532	2.970	3.714	1.218	1.305	1.384	48,3	43,9	37,3			
Davos, CH	2.856	3.364	4.205	1.647	1.734	1.813	57,7	51,5	43,1			
Athens, GR	1.962	2.313	2.891	1.586	1.752	1.936	80,6	75,8	67,0			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
Website	www.solar.demokritos.gr
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Date of test report / G / F	4/9/2013
Test method / G / F	ISO 9459-5 (DST)

Comments of test lab / Kommentare des laboratoriums / Commentaires du laboratoire

English
Deutsch
Francais

Stamp & signature of test lab

Version 0.5, 04-02-2008

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	Date / Datum / Date	30/12/2013

Company / Firma / Société	NOBEL INTERNATIONAL EAD		**Country**/Land/Pays	BULGARIA
Street / Straße / Rue	48, VITOSHA BLV		**Website**	
Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 200/3 ALB
Collector type G F	AELIOS ALB 1500	**No. collectors** G F	2	**Storage type** G F	200L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	170 l/d	200 l/d	250 l/d	170 l/d	200 l/d	250 l/d	170 l/d	200 l/d	250 l/d	170 l/d	200 l/d	250 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	2.637	3.101	3.881	1.323	1.419	1.515	50,3	45,8	39,1			
Würzburg, DE	2.532	2.970	3.714	1.314	1.419	1.533	52,0	47,8	41,2			
Davos, CH	2.856	3.364	4.205	1.813	1.927	2.032	63,4	57,2	48,3			
Athens, GR	1.962	2.313	2.891	1.656	1.857	2.094	84,5	80,3	72,6			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
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Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 200/4 ALB
Collector type G F	AELIOS ALB 2000	**No. collectors** G F	2	**Storage type** G F	200L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	170 l/d	200 l/d	250 l/d	170 l/d	200 l/d	250 l/d	170 l/d	200 l/d	250 l/d	170 l/d	200 l/d	250 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	2.637	3.101	3.881	1.498	1.638	1.787	56,8	52,8	46,1			
Würzburg, DE	2.532	2.970	3.714	1.463	1.612	1.796	57,8	54,2	48,3			
Davos, CH	2.856	3.364	4.205	2.085	2.260	2.444	72,8	67,1	58,1			
Athens, GR	1.962	2.313	2.891	1.770	2.006	2.339	90,1	86,8	81,0			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

Testing Laboratory / Prüflaboratorium / Laboratoire d'essais	**NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB**
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Postal Code, Place / PLZ, Ort / Code postal, Place	2100	SOFIA BULGARIA	**E-mail**	info1@nobel.gr
			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 320/4 ALB
Collector type G F	AELIOS ALB 2000	**No. collectors** G F	2	**Storage type** G F	320L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	250	300	400	250	300	400	250	300	400	250	300	400
	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d	l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	3.881	4.652	6.202	1.901	2.050	2.216	49,0	44,0	35,7			
Würzburg, DE	3.714	4.459	5.948	1.892	2.059	2.243	50,9	46,1	37,6			
Davos, CH	4.205	5.046	6.728	2.584	2.751	2.926	61,5	54,5	43,5			
Athens, GR	2.891	3.469	4.625	2.409	2.716	3.119	83,3	78,3	67,5			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

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			Tel. / Fax	+0359 2 4210232

System family overview / G / F

Collector type G F	**Number of collectors** / G / F																													
	Storage type / G / F																													
	120L						160L						200L						320L											
AELIOS ALB 1500							2						2																	
AELIOS ALB 2000	1							1						1	2				2	3										
AELIOS ALB 2600									1							1														

Name of system konfiguration / G / F					AELIOS 320/6 ALB
Collector type G F	AELIOS ALB 2000	**No. collectors** G F	3	**Storage type** G F	320L

Calculated annual results / G / F

Location G F	**Daily draw-off litres/day** / G / F /											
	250 l/d	300 l/d	400 l/d	250 l/d	300 l/d	400 l/d	250 l/d	300 l/d	400 l/d	250 l/d	300 l/d	400 l/d
	Q_d kWh/y			Q_L kWh/y			f_{sol} %			Q_{par} kWh/y		
Stockholm, SE	3.881	4.652	6.202	2.243	2.497	2.803	58,0	53,6	45,2			
Würzburg, DE	3.714	4.459	5.948	2.190	2.453	2.812	59,0	55,0	47,4			
Davos, CH	4.205	5.046	6.728	3.136	3.451	3.819	74,6	68,4	56,7			
Athens, GR	2.891	3.469	4.625	2.628	3.040	3.697	91,1	87,6	80,0			

Perf. indicators G F		
	Q_d	**Heat demand** / G / F
	Q_L	**System output** / G / F
	f_{sol}	**Q_L/Q_d; solar fraction** / G / F
	Q_{par}	**Elec. for pumps/controllers** / G / F

Ref. conditions G F		Stockholm	Würzburg DE	Davos CH	Athens GR			
	G	1.156	1.226	1.682	1.717			
	Ta	7,5	9,0	3,2	18,5			
	Tc	8,5	10,0	5,4	17,8			
	ΔTc	2.1 - 14.9	7.0 - 13.0	4.6 - 6.2	10.4 - 25.2			

G	kWh/m²	**Annual irradiation South, 45°** / G / F
Ta	°C	**Annual mean air temp.** / G / F
Tc	°C	**Annual mean cold water temp.** / G / F
ΔTc	°C	**Seasonal variation of Tc** / G / F
Th	45°C	**Desired (mix. valve) temp.** / G F

Max. operating press. - collector side G F	300	kPa	**Max. operating press. - tank side** G F	1.000	kPa

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